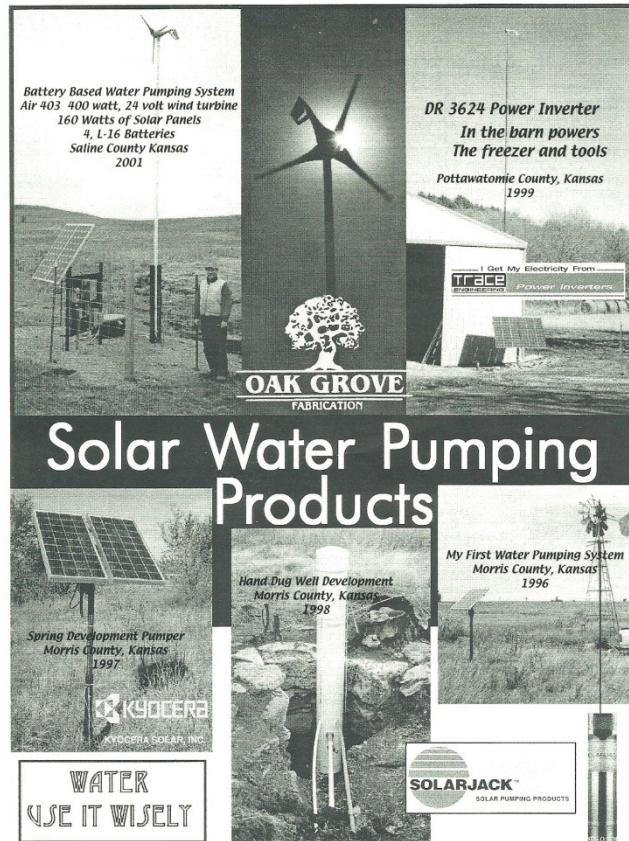


# Kansas Wind & Renewable Energy Conference 2009 10<sup>th</sup> Annual

Small Wind and Solar Update  
Flint Hills Region  
and Eastern Kansas

Presented by: Dave Sampson, Proprietor  
Oak Grove Fabrication  
Alta Vista, Kansas

Oak Grove Fabrication, Alta Vista, Kansas  
 Has been producing catalogs and flyers as advertising since 2001  
 All literature is based on installations performed by OGF  
 1996 to 2008



Lynn Pugh, Pottawatomie Co. Ks  
Off Grid Home 2006  
Oak Grove Fabrication



- 1000 Watt Whisper 200
- Adapted to Aeromotor Tower
- 1040 Watt Solar Array
- 8 ea, Kyocera 130 watt
- OGF built Rack
- Dual DR 3624 Power Inverters
- 8 ea, 12 volt, Sealed Batteries
- 5500 watt Propane Generator
- 1000 gallon Propane Tank
- 65 Gallon Water Tank in House
- Propane Refrigerator
- Propane Wall Heaters
- 160' Deep Well Pump runs from Inverters and Batteries Sunny Day
- Need both SUN and WIND to work



# The Land Institute, Salina, Kansas

## Solar Array, Battery Charger



- The Largest Solar Array in Kansas for many years
- 88ea, 55 watt solar panels
- 4840 watts of output
- 16 ea, L-16 Batteries
- Powers The Sunshine Farm



# Mobile Solar Array for Back up Power

Following the December 07 ice storm, OGF got this order



Delivered July 2008

- 8ea, Sharp 80 watt Solar Panels
- Rack is Axle Mounted w/Center Pivot
- Array : 7'-10" wide x 7'-0" high
- 640 watts @ 48 volts
- Outback MX 60 Charge Control converts the 48 panel voltage to 24 volt battery voltage via MPPT
- Outback FX3524 Power Inverter mobile inverter@ 30 amp output
- 8ea, 12volt, 140AH, Sealed Batteries
- Generator Balancing Transformer
- Insulated & vented Cabinet, Locks
- Insulated & vented Battery Box, Locks
- 5' x 10' Trailer
- \* Tilt up, Dual, 90 watt lamps , 8 ' Mast

# 640 Watt Mobile Power Supply 2008

Power from 3500 Watt Inverter Runs To Critical Load Center

Critical Loads run off Utility Power until Utility Power Fails

Upon Power Outage, Transfer Switch in Inverter Switches to Battery Power.

Quick as a wink Lights Flicker, TV stays on. Computer needs to Re Boot

Battery System will run a 1000 watt load for six hours before recharging

Upon Power Resumption, Transfer switch kicks back to Utility Power.

Inverter becomes a Battery Charger and brings the Battery bank to full  
Voltage

Critical Loads are powered continuously





# UFM House, Manhattan

## Bill Dorsett, Sun wrights, Installer

3000 Watt Grid Tied Solar Array. 2008   Solar Greenhouse Bead Wall 1977





# UFM House, Manhattan

## Xantrex Inverter, Sanyo Solar Panels

### Fat Spaniel Monitor



# Wind Classes for United States

## Wind Map for Kansas

### Wind Classes for US-DOE Wind Maps

Each wind power class should span two power densities. For example, Wind Power Class = 3 represents the Wind Power Density range between 150 W/m<sup>2</sup> and 200 W/m<sup>2</sup>. The offset cells in the first column attempt to illustrate this concept.

Classes of wind power density at 10 m and 50 m <sup>(a)</sup>.

Wind Power Class <sup>*</sup>	10 m (33 ft)		50 m (164 ft)	
	Wind Power Density (W/m <sup>2</sup> )	Speed <sup>(b)</sup> m/s (mph)	Wind Power Density (W/m <sup>2</sup> )	Speed <sup>(b)</sup> m/s (mph)
1	0	0	0	0
2	100	4.4 (9.8)	200	5.6 (12.5)
3	150	5.1 (11.5)	300	6.4 (14.3)
4	200	5.6 (12.5)	400	7.0 (15.7)
5	250	6.0 (13.4)	500	7.5 (16.8)
6	300	6.4 (14.3)	600	8.0 (17.9)
7	400	7.0 (15.7)	800	8.8 (19.7)
	1000	9.4 (21.1)	2000	11.9 (26.6)

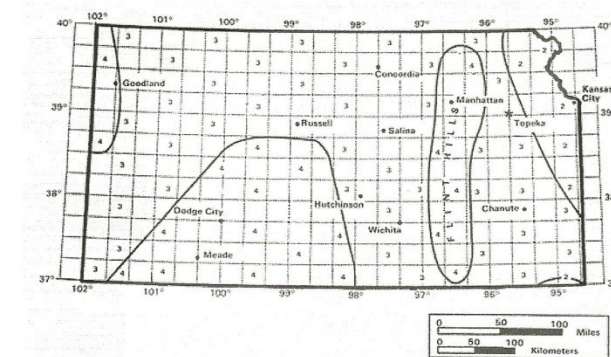
(a) Vertical extrapolation of wind speed based on the 1/7 power law.

(b) Mean wind speed is based on Rayleigh speed distribution of equivalent mean wind power density. Wind speed is for standard sea-level conditions.

Maps courtesy of US-DOE and NREL



### Kansas Wind Map



Maps courtesy of US-DOE and NREL



Description of Wind Classes

Norman Tremeir, Council Grove, Ks  
Prairie Turbines, Carlton, Ks 2009

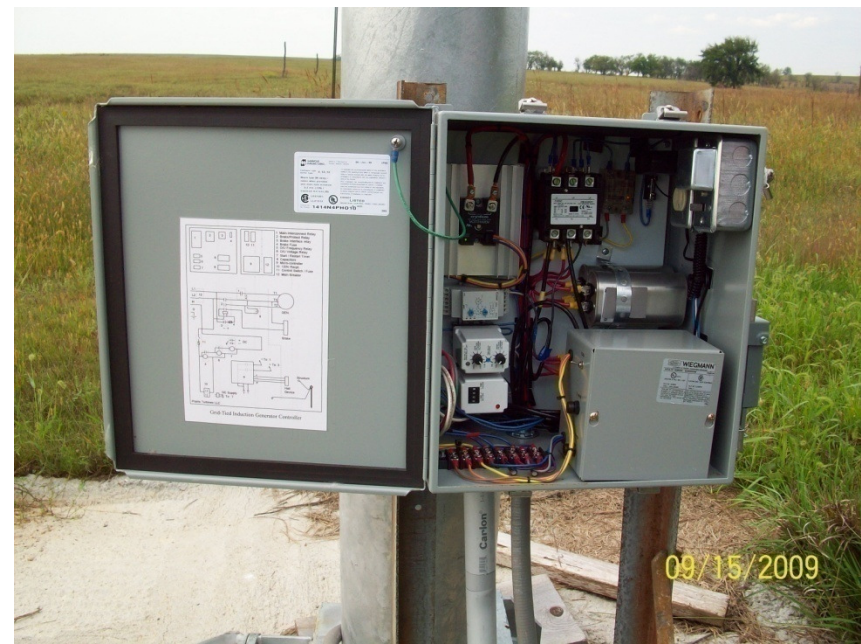
Do it Yourself Turbine  
5kw from 7.5 hp, 3 phase gear motor  
Grid Tied with Flint Hills REC





# Treimer Farms Lyons County, Kansas

**10,000 watt Prairie Turbines 3 phase generator gearmotor**  
**Do it yourself Home built Wind Turbines**



**Left: Turbine disconnect and grid tie to service panel**

**Right: Turbine tower base Control System**

# 5 kW Wind Turbine

Mr. & Mrs. Eldon Moore  
Dwight, Kansas  
Endurance Wind Turbine  
Vancouver, British Columbia  
84 Foot Tilt –up Tower,  
3 phase, 220 VAC, Grid Tie

Commissioned Feb 1, 2009

Email: [btlequip.com](mailto:btlequip.com)  
John Deere Dealer  
Bucklin, Kansas





# Endurance Turbine Tower and Base





# Energy Saving Store, Installer Western Extalite, Manhattan Warehouse



Warm Air is pulled through the south wall from Solar Wall outside and distributed through the sock to the warehouse to take off the chill





# Diamond Solar Manhattan, Ks

Unisolar Roofing Panels

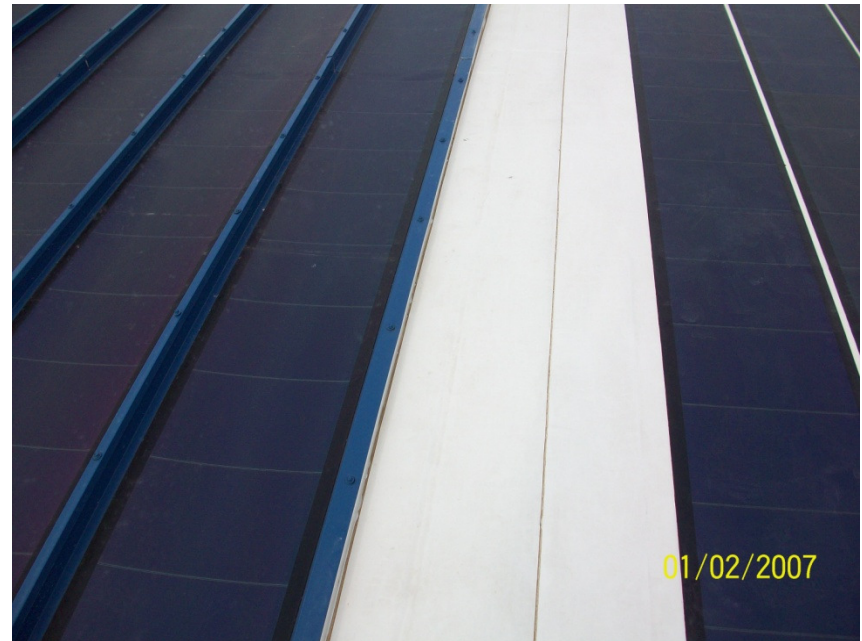
80 ea. 136 watt panels x 18 ' long

10,880 Watt Array

Sticky Back panels adhere to steel and rolled rubber

Wiring made on ridge pole chase way

A contender for largest solar array in Kansas 09





# Diamond Solar

Has placed Unisolar 136 watt panels on various manufacturers products for durability testing  
2009



# OGF Mobile Power System 2003

Used to pump remote wells for ability to yield water

Based on System installed in 2001 to water 120 heifers a day during the winter.



- 160 watt solar array
  - 2 ea, 80 watt Kyocera Solar Panels
  - 24 volt battery charger @ 4.73 amps
- 400 watt wind turbine
  - Southwest Wind Power Air 403
  - 24 volt Direct battery charger
  - 15 amps in a 25 mph wind
  - 4 ea L-16 Lead Acid Batteries
  - SunPumps SDS-Q-128 Sub Pump
  - 150' Pump Cable
  - 300 watt Power Inverter
  - Fluorescent Yard Lamp
  - 4' x 8' Trailer
  - Floating Pump Barge Holds Pump
  - Water Pumped to event on horizon



# Nelson Chicken Hatchery West Wind Energy, Installer



Manhattan Fire Department HQ  
Sky Stream 3.7 Grid Tied to Station

Saves \$500.00/year

Dr. Ruth Miller, Kansas State University , Engineering Students Monitor Turbine Monthly





# Baseball Size Hail Damage, June 16, 2009

## Alta Vista, Kansas



- 160 watt Solar Battery Charger for Fluorescent Yard Lamp. Built 2001
- Two Kyocera KC 80 solar panels were used out of the same box. Always have been paired together this unit.
- Arrow points to initial fatal impact that tore the steel backing sheet. The tempered glass fractured and following hail completed the breaks
- Notice the grouping of the non fatal impacts. The unbroken solar panel on the left underwent the same bombardment without fracturing.
- Conclusion: Solar Panels can take a heck of a beating before fracturing
- A baseball size hail stone with points
- Will destroy the solar panel

# Solar Hot Water---Simple Drain Back System 2009

Four person household . Manhattan, Ks

Solar Hot Water Panels will Provide 70 Percent of need

Two Tank System is Recommended

Solar Heat Exchange Manufacturing, Perry Kansas





# MJ Ranch, Leavenworth County

OGFSolar Water Pumping Trailer holds Pressure tank and Pressure Switch  
Grass Fed Angus Calves are finished on this pasture for sale direct to customers  
Installed 2008



- Pump hangs from barge in pond.
  - Water flows to trailer mounted Pressure tank / pressure switch.
  - Water enters 1700 foot pipeline at hydrant. 12 hydrants along pipeline
  - 70 acre pasture of brome, alfalfa, and red clover is divided with a five strand barb wire fence that runs parallel to pipeline. A hot wire is mounted to the fence.
  - A hot wire can be attached to the fence and used to provide a small paddock for daily grazing.
- 
- \* Solar Array: 260 watts/ 2 ea Sharp 130 watt
  - \* Submersible Pump: Sun Pumps SDS- Q- 135
  - \* Tracker: Zomeworks 020
  - \* Trailer: 4'x 8'

# 1400' Water Pipeline: Solar Supplied

System Waters Two Pastures In Dickinson County

Well is 80 feet deep. Pump set at 75 feet. Water runs to Short Hydrant then to Pressure tank/switch, adjacent stock tank and the Tall Hydrant.

Water flows from Tall Hydrant to 1400' Pipeline.

Stock Tank at end of disturbed ground

Installed August 2008



Solar Array: 260 Watts/ 2 ea, Sharp 130 watt  
Tracker: Zomeworks 020  
Submersible Pump: Sun Pumps, SDS-Q-135



# White Memorial Camp & Conference Center, Council Grove

A dream of 13 years is finally coming true for the camp



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